Principles of Calculus Modeling: An Interactive Approach by Donald Kreider, Dwight Lahr, and Susan Diesel
Exercises for Section 4.4

1. (1 pt)
Evaluate the definite integral
$$\int_{8}^{13} x^3\,dx$$
Enter your answer as a number or fraction.

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2. (1 pt)
Evaluate the definite integral
$$\int_{9}^{12} \sqrt{x}\,dx$$
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3. (1 pt)
Evaluate the definite integral
$$\int_{1}^{3} \left(\frac{7}{x^{10}} - \frac{x^{10}}{7}\right) dx$$
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4. (1 pt)
Evaluate the definite integral
$$\int_{0}^{\frac{\pi}{4}} \sec^2\theta\,d\theta$$
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5. (1 pt)
Evaluate the definite integral
$$\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \sin\theta\,d\theta$$
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6. (1 pt)
Evaluate the definite integral
$$\int_{-8}^{-7} \frac{-10}{1+x^2}\,dx$$
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7. (1 pt)
What is the area of the region bounded by $f(x) = 1/x$, $x = e^3$, $x = e^{10}$, and the x axis? It may be helpful to make a sketch of the region.

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8. (1 pt)
What is the area of the region above the function $f(x) = 8x^2 - 9x$ and below the x axis? It may helpful to make a sketch of the region. Your answer must be a number or fraction.

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9. (1 pt)
Evaluate $\displaystyle\frac{d}{dx}\int_{x^9}^{7} \frac{\sin t}{t}\,dt$.

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10. (1 pt)
Consider the following expression:
$$\frac{d}{dx} x^{10} \int_{3}^{x^{10}} \frac{\sin u}{u}\,du$$
This equals

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A. $10x^9 \displaystyle\int_{3}^{x^{10}} \frac{\sin u}{u}\,du + 10x^{19}\frac{\sin x^{10}}{x^{10}}$

B. $10x^{19}\left(\dfrac{\cos x}{x} - \dfrac{\cos 3}{3}\right)$

C. $10x^9(\cos x^{10}\ln x^{10} - \cos 3\ln 3)$

D. $10x^9\left(\dfrac{\cos x^{10}}{x^{10}} - \dfrac{\cos 3}{3}\right)$

E. $10x^9 \displaystyle\int_{3}^{x^{10}} \frac{\sin u}{u}\,du$

11. (1 pt)
Evaluate the indefinite integral $\displaystyle\int e^{9x}\sin(e^{9x})\,dx$. Use any number as your constant of integration. Enter your answer in terms of x.

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12. (1 pt)
Evaluate the indefinite integral $\displaystyle\int \frac{x^4}{(7x^5+3)^3}\,dx$. Use any number as your constant of integration. Enter your answer in terms of x.

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13. (1 pt)
What is $\displaystyle\frac{d}{dx}(x^{24}\int_{10.5}^{x^2}\cos(t)\,dt)$ in terms of x?

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14. (1 pt)
What is $\displaystyle\frac{d}{dx}\int_{x^3}^{x^6} \frac{8.8(t^2)\ln(t)}{(\cos(t))^2}\,dt$ in terms of x?

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15. (1 pt)
The speed limit is 15 mph and a car is driving at 50 mph. It begins to decelerate at time 1 min, and continues to delecerate so that its speed at time t minutes is given by the formula $\dfrac{50}{t}$ in miles per hour. If policeman clocks the car's speed sometime between time 1 min and time 6 min, what is the probability that he will catch the car speeding at that time?

probability = ______________

16. (1 pt)
What is $\displaystyle\frac{d}{dx}\int_{-1}^{\ln(x)} t^9 + \tan(t)\,dt$ in terms of x?

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17. (1 pt)
What is $\frac{d}{dx}\left((\cos(t))^{23}\int_{t-38}^{-1} y^{(y^2)}\,dy\right)$ in terms of x?

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18. (1 pt)
What is $\frac{d}{dx}\int_{x}^{x+6}\cos(t)\,dt$ in terms of x?

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19. (1 pt)
What is $\frac{d}{dx}\int_{x^2}^{\cos(x)}\frac{t-25}{t-28}\,dt$ in terms of x?

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20. (1 pt)
What is $\frac{d}{dx}\sin(-x-8)\int_{\frac{\pi}{2}}^{x+8}\sin(t)\,dt$ in terms of x? Simplify your answer as much as possible.

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21. (1 pt)
A car's acceleration is modeled by

acceleration in feet per second per second = $\frac{1}{t}$

where t is measured in minutes. What is the change in speed between time = 4 minutes and time = 7 minutes?

__________________ feet/sec

22. (1 pt)
A flower's growth rate is modeled by

growth in millimeters per day = e^t

where t is measured in days. What proportion of the first week's growth (starting on Sunday) happened on Wednesday, Thursday, and Friday?

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23. (1 pt)
What is $\frac{d}{dx}\left(-17x\int_{-9}^{\frac{-x}{17}} e^t\,dt\right)$ in terms of x?

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