

MATH 20C: FUNDAMENTALS OF CALCULUS II
WORKSHEET, DAY #40 (FINAL REVIEW)

1. MULTIPLE CHOICE

- (1) (c)
- (2) (a)
- (3) (d)
- (4) (d)
- (5) (b)
- (6) (b)
- (7) (c)
- (8) (a)
- (9) (a)
- (10) (d)
- (11) (b)
- (12) (b)

2. FREE RESPONSE

- (1) (a) $\ln x/8 + C$;
(b) $2/5x^{2.5} - 2x - 3x^{-1} + C$.
- (2) $\sqrt{1 - 2\cos x}$ (substitute $u = 1 - 2\cos x$).
- (3) $-e^{x-4x^2}$ (substitute $u = x - 4x^2$).
- (4) $19/27$.
- (5) $52 = \int_0^4 (-3t^2 + 12t + 5) dt$.
- (6) $(x - 3)^6/6 + 3/5(x - 3)^5 + C$ (integration by parts or substitute $u = x - 3$).
- (7) $y = (x - 1)e^x + 1$ (if $y' = xe^x$, then $y = \int xe^x dx = (x - 1)e^x + C$ (integration by parts)).
- (8) (a) $-1/\sin x + C = -\csc x + C$ (substitute $u = \sin x$);
(b) $4/\pi = 1/\pi \int_0^\pi 6 \sin(3x) dx$ (substitute $u = 3x$).
- (9) $1/(e^2 - e)(2/e - 3/e^2) = 1/(e^2 - e) \int_e^{e^2} x^{-2} \ln x dx$ (integration by parts).
- (10) $\$267 = FV = \int_0^5 20te^{0.04(5-t)} dt = -500(t + 25)e^{0.04(5-t)} \Big|_0^5$.
- (11) Converges, $5/2$.
- (12) $y = 1/(-x^4 + 3/2)$ (separate variables, $1/y = -x^4 + C$).
- (13) $f_{xx} = 8y^{-1} + y^2x^{-3}$, $f_{xy} = -8xy^{-2} - x^{-2}y$, $f_{yy} = 8x^2y^{-3} + x^{-1}$.
- (14) Relative minima at $(0, 0)$ and $(2, 2)$.
- (15) 20 , obtained at $(-20, -1/2, 1)$ (substitute $z = 10/xy$, $f = 2xy - 10y^{-1} + x$).
- (16) Length and width $4/3$, height $2/3$ ($\ell + w + 2h = 4$, so $V = \ell wh = (4 - w - 2h)wh$).
- (17) Maximum -38 at $(5, 0)$, minimum -50 at $(3, 4)$.