Math 1142 (Lec 020). Spring 2008.
ANSWER KEYS TO SAMPLE FINALS

Spring 2005.

1A 2D 3C 4E 5A 6E 7C 8C 9D 10B 11E 12A
13. $\int_0^1 -2x^2 + 2x\, dx = 1/3$.
15 $y = (1/2)\ln(x^2 + 1)$.
16. Max=f(1)=10, Min=f(2)=8.
17. x=18, y=9.
18. (a) Use substitution $u = 5x$.
(b) Rewrite he integral as $I = 3\int x\ln x\, dx$ and integrate by parts to obtain.

$$I = (3/2)x^2 \ln x - (3/4)x^2 + C.$$

Fall 2004.

1B 2D 3A 4A 5D 6C 7C 8E 9B 10E 11A 12C
13. Max=f(2)=26, Min=f(-3)=1.
15. (0,0) saddle point; (1,1) relative min point.
16. $\int_{-2}^3 -x^2 + x + 6\, dx = 125/6$.
17. (1) Increasing: $(-1, 0)$ and $(1, \infty)$. Decreasing: $(-\infty, -1)$ and $(0, 1)$. Relative max: when $x = 0$. Relative min: when $x = -1, 1$.
(2) Concave up: $(-1, \infty)$. Concave down: $(-\infty, -1)$. Inflection point: when $x = -1)$.
18. Dimension 120 ft x 60 ft (120 ft is the length of the side having no fence).

Spring 2003.

1D 2A 3C 4D 5C 6B 7B 8B 9A
10. A) Critical points: $(0, 12)$ and $(3, -15)$.
B) Among critical points: $(3, -15)$ is a local min point, and $(0, 12)$ ia an inflection point.
C) Increasing: $(3, \infty)$. Decreasing $(-\infty, 3)$.
D) Concave up: $(-\infty, 0)$ and $(2, \infty)$. Concave down: $(0, 2)$.
11. A) Derivative:
$$y' = \frac{3y - 2x}{3y^2 - 3x}.$$

B) Tangent line: $y = (1/3)(x - 2) + 1$.
12. $\int_0^\infty xe^{-x^2}\, dx = 1/2$.
13. Velocity $x'(t) = \frac{1}{10}e^{-t/10}\, t^3(20 - t)$.
Show $x(0) = 0, x'(0) = 0$ and $x'(t) > 0$ for $0 < t \le 10$.
14A. $\int_0^5 xf(x)\, dx = 25/6$.