Answers to Practice Problems for Exam 1  
(Covering Chapters 5–7 and §§8.1, 8.2)  
MATH 132.008 – Applied Calculus, Spring 2011

1–3. See text for answer to odd problems from text.
4. (b)
5. (a) Substitution  
(b) Substitution  
(c) Break up fraction into sum of two different power functions.  
(d) Integration by parts (repeated 2 times)  
(e) Substitution  
(f) Can integrate directly
6. (a) 1.75 psi per second  
(b) 130 \((1 - e^{-2}) \approx 112.4\) psi
7. \(b = 2\)
8. It converges to \(\frac{e^2}{2}\).
9. 250 mg
10. (a) Slope from the point \((0, f'(0))\) to \((3, f'(3))\) is 1.  
(b) The average value of \(f'(x)\) is approximately 1.9 give or take.
11. (a) \(S(t) = 100t\)  
(b) \(FV = PV e^{0.05\cdot18} = \left( \int_0^{18} 100te^{-0.05t} \, dt \right) \left( e^{0.05\cdot18} \right) \approx 22,385\)
12. (a) \(f(x)\) has a local min at \(x = 1\). No local max.  
(b) \(f(x)\) is concave up over the interval \((-1, 3)\) (since \(f'(x)\) is increasing). \(f(x)\) is concave down over the interval \((-2, -1)\) (since \(f'(x)\) is decreasing).?
13. 166
15. (b) is better.
16. The average value of \(f(x)\) is approximately 10. Therefore \(\int_0^{20} f(x) \, dx \approx (10)(20) = 200\).
17. (a) \(P(t) = 200e^{0.24t}\)  
(b) \(\frac{P(24) - P(0)}{24 - 0} \approx 2,636\) bacteria per hour.  
(c) \(\frac{1}{24 - 0} \int_0^{24} P(t) \, dt \approx 10,984\) bacteria.
18. (a) $94,000  
(b) Approximately $33,000 dollars per year.  
(c) 46.8%  
(d) Approximately 14% per year.
19. Over the entire period from 2002 to 2007, the dropout rate has approximately declined by 12%.