MthSc 119, Assignment 1 — Model Solutions

1.1 (a)False; (b)True; (c)True; (d)True; (e)False; (f)False; (g)True; (h)True.

1.2 In Definition 1.2 we have $0|0$, but in the alternative definition $0|0$ is false because $\frac{0}{0}$ is not an integer.

1.3 (a) 3 is a divisor of 21 and $1 < 3 < 21$. Hence 21 is not prime. 21 is composite since $21 = 3 \times 7$ and hence satisfies definition 1.6. (b) 0 is not a prime since 0 fails to be greater than 1. 0 is not composite as there is *no* integer b with $1 < b < 0$. (c) π is not prime since it is not an integer. π fails to be composite for the same reason. (d) $\frac{1}{2}$ is neither prime nor composite since it is not an integer. (e) -2 fails to be prime since it is not greater than 1 and fails to be composite since it is not positive. (f) -1 fails to be prime since it is not greater than 1 and fails to be composite since it is not positive.

1.8 (a) 4 (the divisors are 1, 2, 4, 8);
(b) 6 (the divisors are $2^0, 2^1, \ldots, 2^5$);
(c) $n + 1$;
(d) 4 (the divisors are 1, 2, 5, 10);
(e) 9 (the divisors are $2^0 5^0, 2^1 5^0, 2^0 5^1, \ldots, 2^2 5^2$);
(f) 49